SNS COLLEGE OF TECHNOLOGY

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Department of Biomedical Engineering

Course Name: 23BMB101-Electron Devices and Circuits

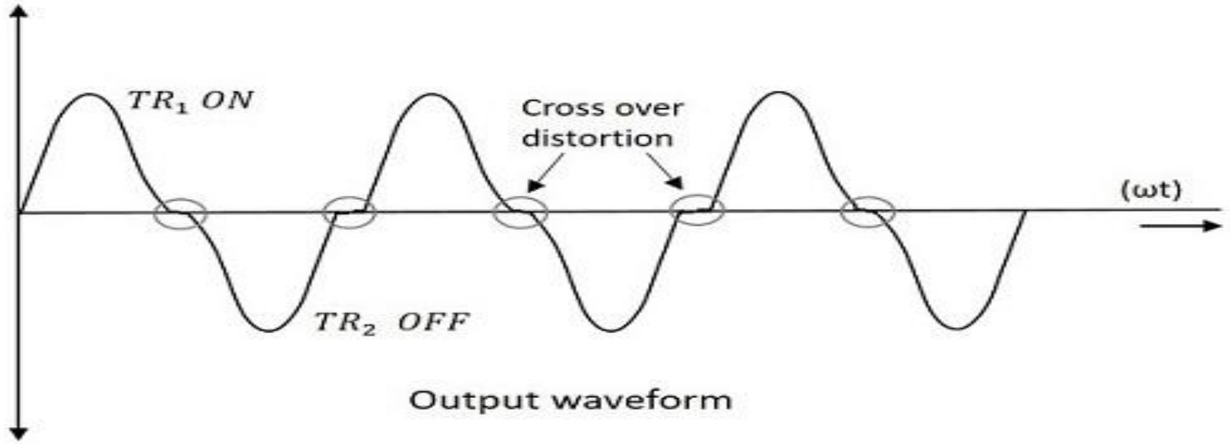
I Year : II Semester

Unit IV –Power Amplifiers & Switching Circuits

Topic : Transformer Coupled Class AB Amplifier

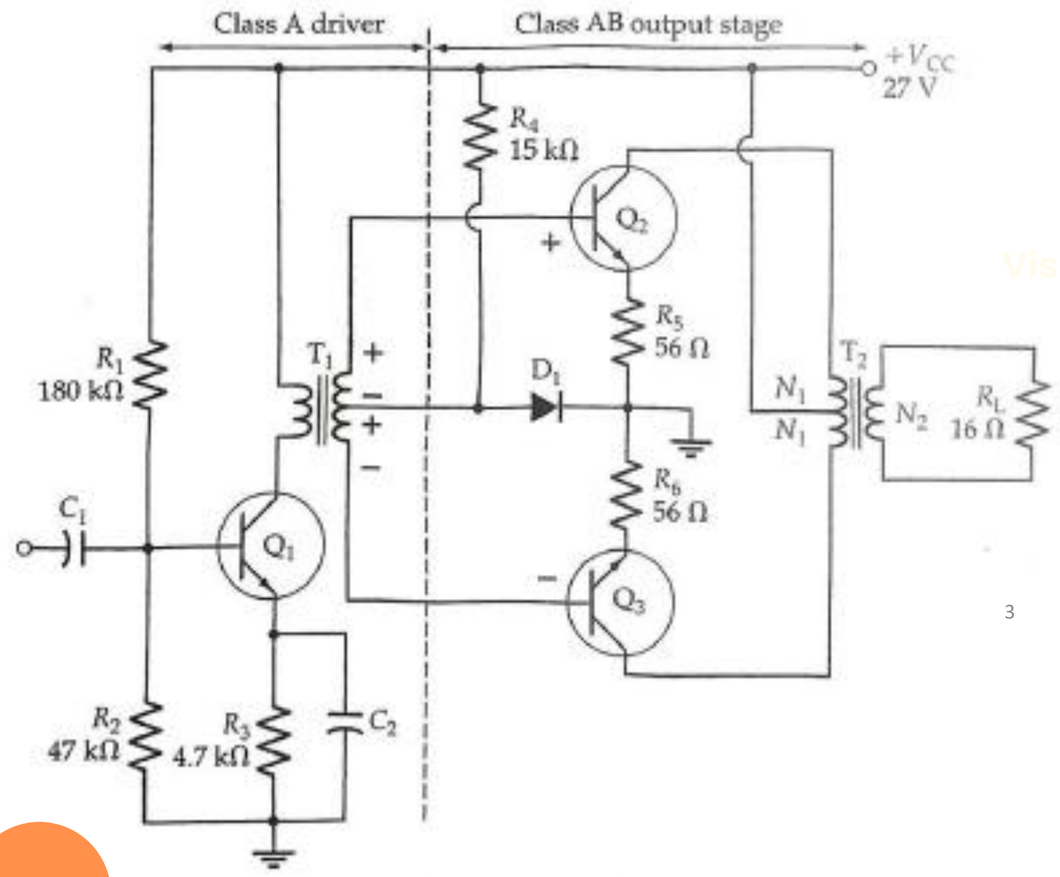
INTRODUCTION

- As class A has the problem of low efficiency and class B has distortion problem, this class AB is emerged to eliminate these two problems, by utilizing the advantages of both the classes.
- When the signal changes or crosses over from one transistor to the other at the zero voltage point, it produces an amount of distortion to the output wave shape.



Output waveform

Class AB Amplifier



- Figure shows a class AB transformer-coupled output stage with a class A transformer-coupled driver stage.
- The output transformer (T2) has a centre-tapped primary winding, with each half of the winding constituting a load for one of the output transistors (Q2and Q3).
- Resistor R_4 and diode D1; bias Q2 and Q3 partially on, and resistors R5 and R6 limit the emitter (and collector) currents to the desired bias levels.

Class AB Amplifier

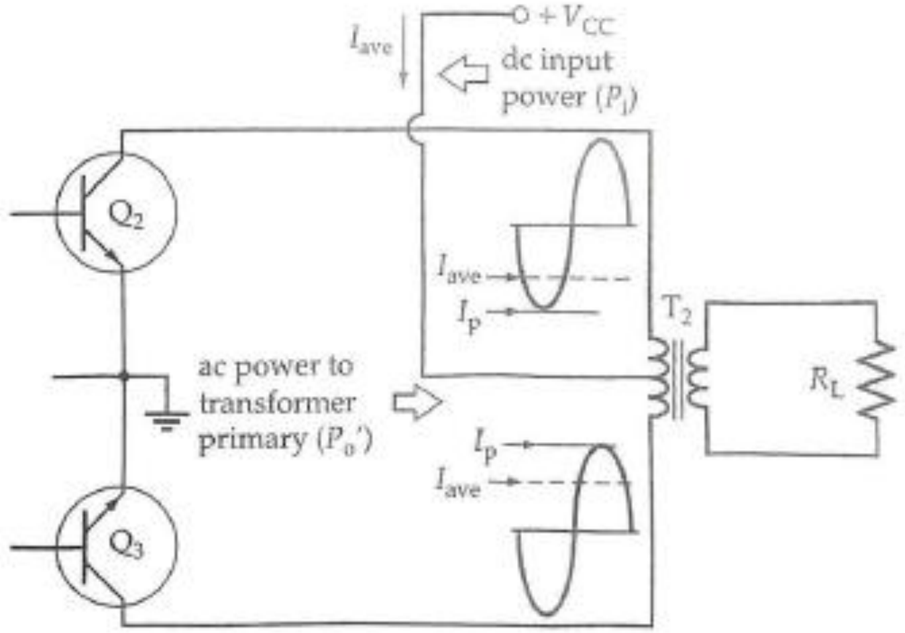
- When the instantaneous polarity of T1 output is positive at the top, Q2 base voltage is positive and Q3 base voltage is negative, as illustrated. At this time Q2 is on and Q3 is off.
- When the polarity reverses at T1 output, the base of Q3 becomes positive and that of Q2 becomes negative.
- The output stage functions exactly as for a class B circuit, except that each device commences to conduct just before the signal to its base becomes positive. This eliminates the transistor turn-on delay that creates crossover distortion in a class B amplifier.

Class AB Power Amplifier

- The current in each transistor is the average value of half sine loop.

$$I_{dc} = \frac{(I_C)_{max}}{\pi}$$

$$(p_{in})_{dc} = 2 \times \left[\frac{(I_C)_{max}}{\pi} \times V_{CC}\right]$$



- R.M.S. value of collector current = $(I_C)_{max}/\sqrt{2}$
- R.M.S. value of output voltage = $V_{CC}/\sqrt{2}$

$$(P_O)_{ac} = \frac{(I_C)_{max}}{\sqrt{2}} \times \frac{V_{CC}}{\sqrt{2}} = \frac{(I_C)_{max} \times V_{CC}}{2}$$

- Overall efficiency $\eta_{overall} = \frac{(P_O)_{ac}}{(P_{in})_{dc}} = \frac{(I_C)_{max} \times V_{CC}}{2} \times \frac{\pi}{2(I_C)_{max} \times V_{CC}}$ = 78.5%